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Effects of Jigsaw IV Instructional Strategy on Senior Secondary School Students' Interest in Physics

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ABSTRACT

The study investigated into the effects of Jigsaw IV instructional strategy on senior secondary school students' interest in physics. Three research questions and three hypotheses guided the study. The study adopted a quasi-experimental non-equivalent control group design. A sample size of 186 Senior Secondary two (SS 2) students from six schools in Abakaliki Education Zone were used as research subjects in the study. Physics Interest Scale (PIS) research instrument developed by the researcher was used for data collection. The Physics Interest Scale (PIS) is made of 27 items and was used in accessing students' interest in physics. The instrument was face validated by three subject specialists; one from measurement and evaluation and two from physics education. The reliability coefficient of PIS using the Cronbach Alpha was 0.6 indicating the instrument is reliable. The research questions were answered using mean and standard deviations while Analysis of covariance, ANCOVA was used for the hypotheses testing at 0.05 level of significance. The results indicated that Jigsaw IV instructional strategy improved students' interest in physics than the lecture method. The researcher therefore concluded that Jigsaw IV instructional strategy is effective in improving students' interest in physics. Based on the findings, it was recommended among other things that physics teachers should be trained on how to use Jigsaw instructional strategies in teaching to make learners active for effectiveness and quality learning to be achieved in science education particularly in physics.

Keywords: Physics, Jigsaw IV, Senior Secondary Students, Interest, and Gender

INTRODUCTION

Man study Physics to unlock the secrets of the universe, as physics takes a thrilling journey through the fundamental laws and principles that govern everything from the smallest particle to the vast expanse of cosmic creation. Physics is a science subject that deals with matter, energy and force. Young and Freedman (2023) define physics as essential scientific subject, which studies the universe. Physics is also seen as the bedrock to engineering and technology as no engineer could make a design without first understanding the fundamental laws of physics. Feynman, Leighton and Sands (2023) stated that, physics is a part of natural philosophy and a natural science that involves the study of matter and its motion through space and time. It also relates with concepts such as energy and force. Physics plays a central role in many different sectors of industry such as telecommunications, architecture, engineering, electricity production and transmission, construction, and transport. It also provides employment for people who are in occupations that are engaged in physics as a scientific discipline for example teachers, scholars, and researchers (Udoh, 2024). Physics provides opportunities towards enhancing analytical skill, technological advancement and wealth creation (Juceviciene and Karenauskaite, 2022. Despite the importance of physics in scientific discipline, the interest of students in the subject in Ebonyi state has not been encouraging over the years (Damoeroem, 2022). Ajiboye and Ajitoni (2023) asserted that efforts should be made to develop interest in learners in order to make better achievement.

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Interest is a central factor on the choice of a given endeavor. Udoh and Akpan (2024) defined interest as a feeling of like or dislike towards activity or something. Interest is also defined as the feeling one has in the course or process of wanting to know or learn about something or someone (Okorie, 2022). Udoh, (2024) found that interest in physics is not only low but also on the decline in Nigeria. Some researchers Gilbert, (2024) identified pedagogy used by teacher in order to enhance interest in physics. This process encompasses gender equality.

Gender is the range of characteristics as regards to, and differentiating between male and female. According to World Health Organization (WHO), gender is characterized by socially constructed roles, function behavior activities which are considered to be appropriate for men and women, which may eventually lead to inequality between both groups in academic achievement. Gender equity is a major issue in the on-going reform programs embarked upon by the Federal Government of Nigeria and it is designed to address gender imbalance in education, this is because girls' access to basic education, especially in Nigeria has remained low (Salman, 2023). The improved awareness of the significant role of education has brought about increase in school enrolment and literacy level among girls particularly in developing countries, but disparity remains an issue between boys and girls in the study of courses in sciences and technology. Therefore, this study aims to ascertain the effects of jigsaw IV instructional strategy on secondary school students' interest in physics in Abakaliki education zone.

Jigsaw IV instructional strategy, one of the cooperative learning strategies, is based on group dynamics and social interactions. According to Sahin (2022), this strategy includes two different treatments with different small groups in order to help learning and improve cooperation among students. It was originally designed by Aronson (2023) to help weaken racial cliques in integrated schools. Jigsaw IV is an instructional strategy in which members of a class are organized into home groups; the students are then reorganized into expert groups containing one member from each home group. The members of the expert group work together to learn concepts or solve problems and then return to their home groups to share their learning or what they learnt in the expert group one after the other, based on the topic or sub-topic assigned to them in their expert group. In this way, the work of the expert groups circulates throughout the class.

Generally, the main purpose of this study is to determine the effects of Jigsaw IV instructional strategy on the mean interest score of secondary school physics students.

Research Questions

The following research questions guided the study:

1. What is the effect of Jigsaw IV instructional strategy on secondary school physics students' mean interest score in physics?

2. What is the effect of Jigsaw IV instructional strategy on male and female secondary school students' mean interest score in physics?

3. What is the interaction effect of teaching methods and gender on secondary school students' means interest score in physics?

Hypotheses

The following null hypotheses were formulated for the study and were tested at 0.05 level of significance:

Ho_1: There is no significant difference in mean interest rating scores of students taught physics using Jigsaw IV instructional strategy and those taught using lecture method.

Ho_2: There is no significant difference between the mean interest rating scores of male and female secondary school students taught physics using Jigsaw IV instructional strategy.

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Ho_3: There is no significant interaction effect of methods and gender on students' mean interest rating scores in physics.

METHODOLOGY

The researcher adopted quasi-experimental design. In a quasi-experimental study, there is no random assignment of subjects. Intact classes were used for the study. The specific design the researcher used for the study is pre-test post-test non-equivalent control group design. The choice of this design is because it offers maximum control over extraneous variables. According to Abonyi, Okereke, Omebe, Anugwo and Nnachi (2022), this design helps a researcher to establish control over internal factors or variables capable of invalidating the findings of the study.

The study was carried out within the Abakaliki Education Zone of Ebonyi State. Ebonyi State is divided into three Education zones; Abakaliki Education Zone, Onueke Education Zone and Afikpo Education Zone. Abakaliki Education Zone was chosen.

The population of the study consist all the SS2 physics students totaling 1,831 students (1,270 males and 561 females) from 80 co-education schools in Abakaliki Education Zone (Ebonyi State Secondary Education Board, 2025).

Sample size of 186 students from the intact classes of six co-education schools was used for the study. This comprise of 92 male and 94 female students. The total number of students in the experimental group is 91 students (32 males and 59 females) and the total number of students in the control group is 95 (43 males and 52 females) given a total number of 186 students. The six secondary schools were drawn using simple random sampling technique after stratifying all the secondary schools in the zone according to their Local Government Area. This is to ensure that schools selected are not close to each other. Three secondary schools were assigned to the treatment group while the other three were assigned to the control group through a simple toss of coin.

The Physics Interest Scale (PIS) was face validated by three experts; two from the Physics Education and one from Measurement and Evaluation in Ebonyi State University, Abakaliki. The experts checked the PIS to see whether the items are relevant, adequately covered the contents, whether the language was ambiguous and ideas were not repeated. The corrections, recommendations and suggestions of these experts were incorporated in the final production of the PIS. The PIS was administered to 30 students in Afikpo Education zone outside the researcher's area of study, to ascertain its reliability index. The Physics Interest Scale was subjected to test of reliability using the Cronbach Alpha approach. The reliability yielded a coefficient index of 0.66 showing high reliability since the index value is above 0.5

From the data generated, mean and standard deviation were used to answer the research questions while ANCOVA was used to test the entire hypotheses at 95% confidence level.

RESULTS

Table 1: Interest Mean of Students Based on Teaching Strategy

Teaching Method	**N**	**Mean X**	**Standard Deviation**
Jigsaw IV Instructional Strategy	91	97.13	4.89
Lecture Method	95	70.17	2.16

Researcher's Field Work, 2026

Summary of result presented in Table 1 indicates that the interest mean score of students taught physics using Jigsaw IV instructional strategy was 97.13 with standard deviation of 4.89. While, that of interest mean score

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and standard deviation of students taught using lecture method were 70.17 and 2.16 respectively. Therefore, the interest mean score of the students taught using Jigsaw IV instructional strategy (97.13) is greater than the interest mean score (70.17) of those taught using the lecture method. This implies that Jigsaw IV instructional strategy enhanced student's interest in physics more than the lecture method. Also, both groups have interest in physics. Those in experimental group showed higher interest.

Table 2: Interest Mean Score of Students Based on Gender

Gender	**N**	**Mean X**	**Standard Deviation**
Male	32	97.16	5.25
Female	59	97.12	4.74

Researcher's Field Work, 2026

Results presented in Table 2, indicates that the interest mean score and standard deviation of male students taught physics using Jigsaw IV instructional strategy were 97.16 and 5.25 respectively. While that of interest mean score and standard deviation of female students was 97.12 and 4.74 respectively. Based on the mean values, male students had higher mean interest score than female students when taught physics using Jigsaw IV instructional strategy.

Table 3: Students' Interest Mean Scores Based on Interaction Effect of Teaching Methods and Gender

Method	**Male (X)**	**Female (X)**
Jigsaw IV Instructional Strategy	97.16	97.12
Lecture Method	70.14	70.18

Researcher's Field Work, 2026

Based on the results in Table 3, it revealed that Jigsaw IV instructional strategy favored both male and female students than the lecture method. This implies that there is no interaction effect between method and gender.

Ho_1: There is no significant difference in interests mean scores of students taught physics using Jigsaw IV instructional strategy and those taught using lecture method.

Table 4: ANCOVA Results of Interest Mean Scores on Teaching Method

Sources of Variance	**Sum of Squares**	**DF**	**Mean Square**	**F**	**Sig. of F**	**Decision**
Corrected Model	33808.647[a]	4	8452.162	593.371	.000	
Intercept	1639.116	1	1639.116	115.072	.000	
PRETEST	17.449	1	17.449	1.225	.270	
METHOD	**5039.674**	**1**	**5039.674**	**353.803**	**.000**	**S**
GENDER	.063	1	.063	.004	.947	
METHOD * GENDER	.176	1	.176	.012	.912	

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Error	2578.219	181	14.244			
Total	1328887.000	186				
Corrected Total	36386.866	185				
Corrected Model	33808.647[a]	4	8452.162	593.371	.000	

S: Significant at p < 0.05 (Researcher's Field Work, 2026)

Results presented in Table 4 revealed that the F-ratio for method was 353.803 with significance of F-value of 0.000. The significance of F-value 0.000) is less than the alpha level (0.05). Therefore, HO_1 was rejected. This means that there is significant difference in interests mean scores of students taught physics using Jigsaw IV instructional strategy and those taught using lecture method. This finding implies that difference between the interest mean was not by chance occurrence but systematic. Statistically, the interest mean scores are not equivalent. Jigsaw IV instructional strategy is more effective to lecture method in enhancing students' interest in physics.

Table 5: ANCOVA Results on Student's Interest Based on Gender

Source of Variance	**Sum of Squares**	**DF**	**Mean Square**	**F**	**Sig. of F**	**Decision**
Corrected Model	7.732[a]	2	3.866	.158	.854	
Intercept	306.826	1	306.826	12.554	.001	
PRESTEST	7.702	1	7.702	.315	.576	
GENDER	**.415**	**1**	**.415**	**.017**	**.897**	**NS**
Error	2150.686	88	24.440			
Total	860707.000	91				
Corrected Total	2158.418	90				

NS: Not Significant at p > 0.05. (Researcher's Field Work, 2026)

Table 5 shows that F-ratio for gender is 0.017 and the significance of F to be 0.897. Since, the significance of F (0.897) is greater than the alpha level (0.05). Therefore, there is no significant difference between the interests mean scores of male and female secondary school students taught physics using Jigsaw IV instructional strategy. The fact that male students had higher mean interest score than the female students (see Table 2) cannot be attributed to the effect of treatment. Statistically, the interest mean scores are equivalent.

Table 6: ANCOVA Results of Interest Mean Scores based on Interaction Effect of Method and Gender

Sources of Variance	**Sum of Squares**	**DF**	**Mean Square**	**F**	**Sig. of F**	**Decision**
Corrected Model	33808.647[a]	4	8452.162	593.371	.000	
Intercept	1639.116	1	1639.116	115.072	.000	
PRETEST	17.449	1	17.449	1.225	.270	

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METHOD	5039.674	1	5039.674	353.803	.000	
GENDER	.063	1	.063	.004	.947	
METHOD * GENDER	**.176**	**1**	**.176**	**.012**	**.912**	**NS**
Error	2578.219	181	14.244			
Total	1328887.000	186				
Corrected Total	36386.866	185				
Corrected Model	33808.647[a]	4	8452.162	593.371	.000	

NS: Not Significant at p > 0.05 (Researcher's Field Work, 2026)

Result in Table 9 revealed that, interaction of method and gender has F-value of 0.012 with Significance of F 0.912. Since, the Significance of F (0.912) is greater than the alpha level of 0.05, HO_3 was accepted. This means that, there is no significant interaction effects of method and gender on students' interest mean scores in physics.

DISCUSSION OF FINDINGS

The result from this study as shown in Table 1, indicated that students taught physics using Jigsaw IV instructional strategy had higher interest mean score than those taught using the lecture method. Test of hypothesis 1 showed that there was statistically significant difference between the interests mean scores of the treatment and control groups. This finding implies that the difference between the interest mean scores were systematic and not due to chance occurrence. The mean interest scores were not equivalent statistically.

The findings agree with some studies by Gilbert (2024), Hence (2024) Nam (2024), that cooperative learning strategies like the Jigsaw IV instructional strategy is associated with and enhances the development of general interest of the learner. Studies by Udo and Akpan (2024) as well as Abbas (2021), found that Jigsaw technique enhance interest of students in geometry.

Findings on Effect of Jigsaw IV instructional strategy on male and female secondary school students' mean interest score in physic revealed that male students had higher interest mean score than female students. This finding implies that when physics is taught using the Jigsaw IV instructional strategy, male students will have greater interest in physics than female students.

The higher mean interest score of male students seemed to support to the assertion of Fakoredo in Nworgu et al. (2022) that girls have less interest in in science subjects, such as physics. The findings agreed with the findings of Sule, (2023) and Bacon (2024); that male students had higher interest score than the female students in physics, Integrated Science and Biology respectively and that there was no significant difference in the mean interest scores of male and female students. On the contrary, Okeke (2024) found that female students' interest mean score was higher than that of male students. Similarly, Goodman (2022) found out that the difference between the mean interest scores of male and female students in Biology was significant.

Result on interaction effect of teaching methods and gender on students' interest in physics shown in table 3 revealed that male students taught physics using Jigsaw IV instructional strategy had higher mean interest scores than their female counterparts taught using the lecture method. The table also showed that female students who were taught physics using the Jigsaw IV instructional strategy had higher mean interest score than female students taught using the lecture method. For each of the two levels of gender, there was higher mean interest score for the students taught using Jigsaw IV instructional strategy. This means that there is no interaction effects of method and gender on students' interest mean score in physics.

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The findings contradicted those of Ugwu and Okeke (2024) who in separate studies found that there was interaction effect of teaching methods and gender on students' interest in Basic Science, Chemistry and Giology respectively. Mbacho and Changeiywo (2023) found that the interaction effect of methods and gender on interest was statistically significant while Ugwu and Okeke (2024) found that the interaction effect of methods and gender on students' was not significant.

CONCLUSION

The difference in the interest mean score of the treatment groups was not by chance but due to effects of the treatment. Therefore, Jigsaw IV instructional strategy enhanced students' interest in physics than the lecture method. The difference between the mean scores are due to chance occurrence and not systematic. Also, interest mean scores of Jigsaw IV instructional strategy were free from gender bias. Therefore, the strategy favored male and female students based on interest.

RECOMMENDATIONS

Based on the findings, the researcher made the following recommendations:

1. Science teachers should utilize the Jigsaw instructional strategy during instructional delivery.

2. Teachers should be trained effectively so that they can master constructivist learning strategies for improvement in instructional delivery.

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